

**Amendments to the Specification:**

Please replace the Abstract with the following amended Abstract:

A cellular automaton cache memory architecture. On a micro-processor that is also capable of executing general-purpose processor instructions, a cache memory is provided to store instructions and data for use by the processor. The cache memory is further capable of storing data representing a first state of a cellular automaton at a first time step, where the data is organized in cells. A cellular automaton prefetch unit prefetches data associated with a cell to be updated and a neighborhood buffer stores the prefetched data. A cellular automaton update unit provides data from the neighborhood buffer ~~selected cells of the cellular automaton~~ to an update engine. The update engine includes a microprocessor execution unit capable of executing at least some general purpose microprocessor instructions and updates at least some of the selected cells according to an update rule and a state of any associated neighborhood cells to provide a state of the cellular automaton at a second time step. For one aspect, the memory, the update unit and the update engine are implemented on a single micro-processor integrated circuit chip.